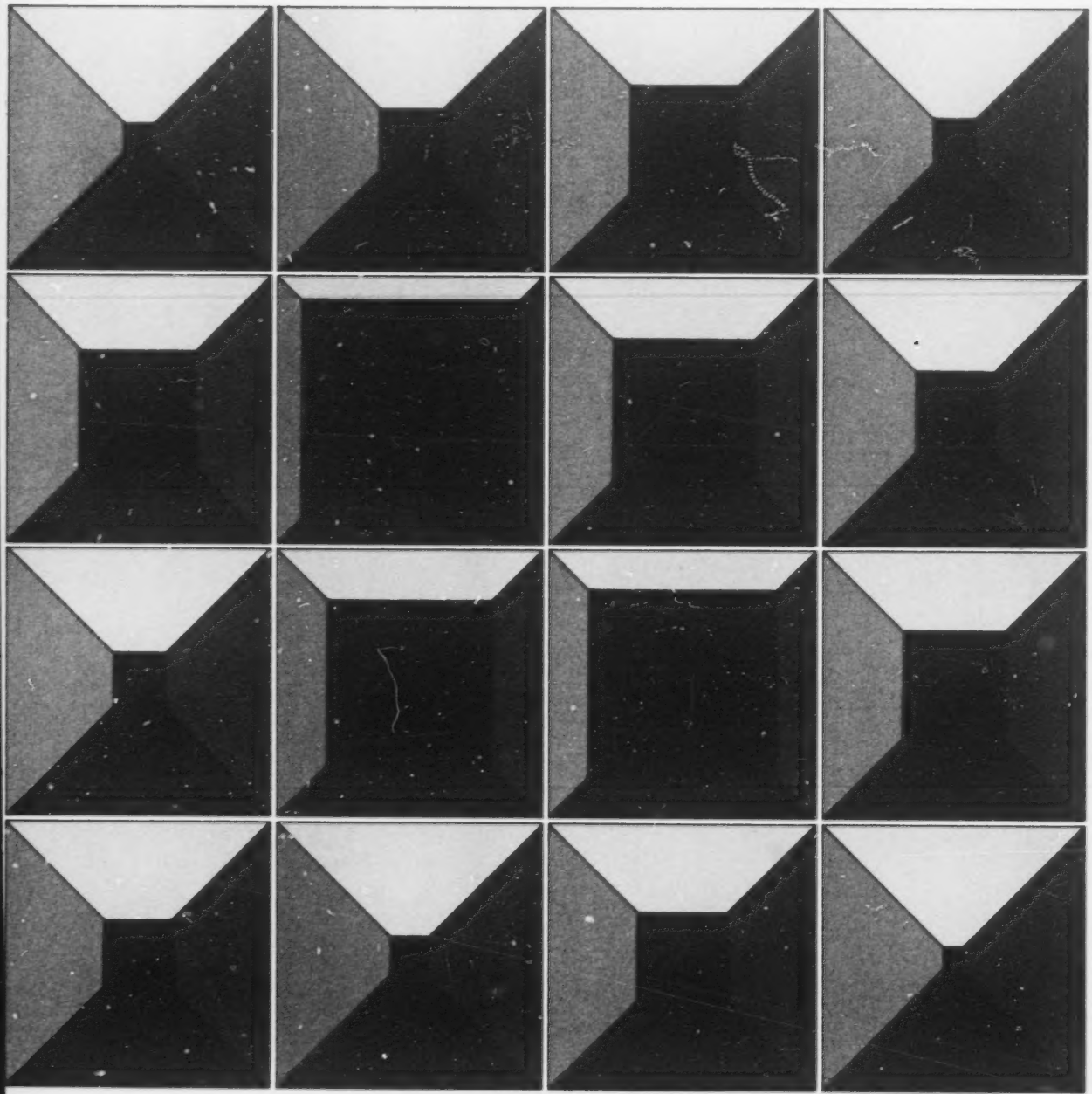
A CBO Study

Farm Revenue Insurance: An Alternative Risk-Management Option for Crop Farmers

August 1983

Congress of the United States
Congressional Budget Office



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FARM REVENUE INSURANCE:
AN ALTERNATIVE RISK-MANAGEMENT OPTION
FOR CROP FARMERS

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PREFACE

In the years ahead, crop farmers are likely to face greater financial risks and long-term income instability than in the past. This is because their dependence on export markets exposes them to other nations' farm, economic, trade, and foreign policies, and to the vagaries of global weather. Although the public has long shared some of the risks in crop farming through commodity programs and federal crop insurance, commodity policy has undergone a long-term transition that has made farmers more dependent on markets. Moreover, beyond their expense, current programs are not very effective in reducing the income instability caused by international events and conditions.

This special study, requested by the Senate Agriculture, Nutrition, and Forestry Committee, examines the role that revenue insurance could play in agriculture policy. The principal author is James G. Vertrees. The study was prepared in the Natural Resources and Commerce Division under the supervision of David L. Bodde and Everett M. Ehrlich. The author wishes to acknowledge the contribution of Andrew S. Morton who provided many constructive comments and suggestions. Francis Pierce edited the manuscript, with the assistance of Nancy H. Brooks. The author owes special thanks to Kathryn Quattrone for typing the several drafts and preparing the manuscript for publication. In keeping with the Congressional Budget Office's mandate to provide an objective and nonpartisan analysis of issues before the Congress, no recommendations are offered.

Alice M. Rivlin
Director

August 1983

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SUMMARY

Farmers' incomes are subject to wide swings from year to year. Farm revenue insurance has been suggested as a way of stabilizing incomes at less cost to the taxpayer than present programs. Its purpose would be to reduce the variability of farmers' incomes, not to raise the average level. This paper reviews the conditions that have given rise to the concern over farm income instability, and the options currently available to farmers for dealing with it. The paper then analyzes a hypothetical revenue insurance program.

The Changing Policy Perspective

Public policy has long acknowledged the risk and uncertainty facing grain and cotton farmers that arise from weather, biological processes, and the relative insensitivity of supply and demand to price changes. Federal programs since the 1930s have sought to assist crop farmers by transferring some of their price and income risks to the public sector through agricultural price support programs.

But these commodity programs have, over time, transferred risks back to farmers and made them more dependent on the markets for their crops. These markets, in turn, have grown increasingly international in character, especially in the last decade. In the 1970s, U. S. agricultural exports grew at an extraordinary rate--20 percent per year, increasing from about $7 billion in fiscal year 1970 to nearly $41 billion in fiscal year 1980. This growth was driven by an expanding world population, rising real per capita incomes in many nations, production limitations in food-deficit nations, the emergence of the Soviet Union as a major grain importer, favorable shifts in exchange rates, and U. S. farm policies that generally encouraged exports. Today, exports take the production from about two of every five acres, and generate about one-fourth of gross farm income. Producing for export markets has allowed farmers to make fuller use of the land and capital resources available to them: virtually all of the one-third increase in crop output in the 1970s was for export.

While the expansion of world trade benefited U. S. agriculture, it forged links that were to prove troublesome for farm income in the early 1980s. Farm prices and incomes have become highly sensitive to global weather and crop production, population changes, and economic growth. Perhaps more significantly, they have also become sensitive to the farm, economic, trade,

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and foreign policies of other nations. Changes in foreign crop production and the policies of other nations are rapidly transmitted to the U. S. crop sector through the international financial system and through flexible exchange rates. The United States, because of its relatively open agricultural markets, bears most of the burden of adjustment to changes in world trade. The result has been to increase farmers' uncertainty as to the prices they will receive for their crops.

Present price support programs have the disadvantage of being unable to stabilize farm income sufficiently, and are also burdensome to the taxpayer. Farmers' incomes are far more variable than incomes of nonfarmers. Although crop farmers' incomes are less variable than would be the case without commodity programs, adjustments in these programs can do little to reduce income instability caused by unexpected changes in export markets. Equally important, these programs, which mainly finance farmers' inventories, expose taxpayers to large outlays: in fiscal year 1983, crop program outlays are estimated at $13.1 billion, or about two-thirds of total price support outlays of $21.3 billion. And even though crop program outlays are projected to decline to $7 to $8 billion annually in 1984-1988, they will still be roughly four times historical levels. The attempt to stabilize both prices and supplies in order to stabilize incomes is very costly to taxpayers.

Farm Revenue Insurance

Revenue insurance, provided by the federal government, would aim directly at stabilizing crop farmers' incomes. It would guarantee a farmer that revenue per acre of each crop would not fall below some proportion of expected revenues. For example, a corn farmer might insure 75 percent of average revenues per acre based upon recent experience. If revenue from the corn crop was less than the insured level--due to either low yields or low prices--the farmer would receive an indemnity equal to the difference. There would be no indemnity if revenue levels were inside the normal range of variation.

In this manner, revenue insurance would protect farmers against precipitous declines in gross income regardless of whether price or production variability was the cause. In exchange for this protection, farmers would ideally pay an annual premium that reflected their individual risks. This would minimize the possibility that farm revenue insurance would encourage inefficient farming.

As compared to the present system of commodity programs for stabilizing prices, and federal crop insurance for protecting against produc-

tion losses, revenue insurance might provide crop farmers more effective protection against volatile incomes. A reduction in risk and income instability could contribute to a more efficient allocation of resources; the dampening of sharp swings in farm incomes would benefit farmers, rural communities, and agricultural supply industries. Furthermore, under a revenue insurance program, the federal government would not have to intervene as frequently in markets to stabilize prices as is now the case. This would reduce direct government influence on prices, production, and the allocation of supplies. Moreover, unanticipated changes in commodity programs would no longer be a source of market uncertainty. In the absence of commodity programs, however, prices most likely would be more unstable than they are now since nonrecourse loans and the farmer-owned reserves would not act to set either a price floor or a price ceiling. A special grain reserve could be set up to protect consumers against the adverse consequences of commodity shortages.

From a federal budget viewpoint, the costs of a revenue insurance program would depend upon the specific insurance provisions, the level of coverage, the premiums charged, and farmer participation. Revenue insurance could probably be provided at a smaller cost than that of continuing current programs. This tentative conclusion is based upon several considerations. First, under current programs 30 to 40 percent of price support outlays are for price stabilization activities that would not be necessary under farm revenue insurance. Second, the administrative and operating expenses of a farm revenue insurance program would probably be no more than the same expenses for continuing current programs. Third, under revenue insurance some share of costs would be paid by farmers through insurance premiums.

There would be some important constraints to a workable program. First, the principle of revenue insurance assumes random variation about an acceptable average level of income. The Congress would have to accept the mean level of farm income over time and adhere to the income stabilization objective of revenue insurance. For this reason, revenue insurance seems most applicable to a situation in which farmers produce for export markets that grow at an average rate sufficient to utilize U. S. production capacity, and in which average incomes provide adequate returns to resources, despite wide swings. For the same reason, revenue insurance seems less applicable in a long-term situation of sluggish export growth, excess production capacity, and low but stable incomes.

Second, there is a set of insurance problems to be addressed: measuring risks and predicting losses; determining premiums that reflect individual farm risks so that high-risk farmers are not encouraged to participate to the exclusion of others; encouraging, perhaps requiring, farmers to stay in the

program for a multiyear period; and reducing the possibilities that farmers can take actions that directly influence insurance indemnities.

Third, there is a related problem of inducing sufficient farmer participation over time to have a large enough pooling of risks to make a workable program. Farmers' participation would depend upon their perceptions of the need for insurance, on insurance costs, and on expected net returns from insurance. Those most vulnerable to farm income variability would be most likely to participate. Among them would be farmers most dependent upon farm income; farmers with large debt-to-asset ratios; and new entrants. One way of increasing participation would be to subsidize the premiums. This would be consistent with the view that society would benefit from sharing farming risks. The larger the premium subsidy, however, the more farm revenue insurance would encourage inefficiency and tend to become simply an income transfer program.

Revenue insurance is worth further exploration as an alternative to current programs, despite the many difficulties in making such a significant policy shift. To obtain a better understanding of how revenue insurance might work, the Congress could take two initiatives. First, it could authorize studies of program design and implementation schemes. Second, if such studies provided evidence that revenue insurance could be workable, it could authorize a pilot revenue insurance program in selected areas or crops. Evaluation of a pilot program would help to determine the feasibility of revenue insurance.

CHAPTER I. INTRODUCTION

Agricultural production has always been an inherently risky business, partly because of the vagaries of weather and of biological processes. Once planting decisions are made, farmers have little opportunity to influence the size of their crops. This makes agricultural production susceptible to relatively large fluctuations. These abrupt changes on the supply side of the equation can cause highly unstable prices and incomes.

Today, however, crop farmers face even greater hazards from external forces. Agricultural exports, which grew at a rate of 20 percent per year in the 1970s, are now the single most important factor in crop farmers' incomes. They take the production from about two of every five acres, and generate one-fourth of farm cash receipts. As producers have grown increasingly dependent on volatile export markets, their incomes have become sensitive to changes in weather and crop production in other countries, as well as to shifting farm, economic, trade, and foreign policies here and abroad. Nations today are closely linked through international financial markets, and the system of flexible exchange rates rapidly transmits economic fluctuations from one country to another.

The position of the United States in world agricultural markets is such that its farmers are especially vulnerable to changes in world trade. When world markets expand, as they did in the 1970s, U. S. farmers are likely to capture the largest share of the increase because of their productive capacity and large stocks. Conversely, they have difficulty in maintaining their share when world markets contract. Their leverage is determined by worldwide economic and financial conditions, crop conditions, and foreign exchange rates. International politics--most important, U. S.-Soviet relations--have also exerted a strong influence, first boosting grains sales in the early 1970s and then causing them to decline at the end of the decade.

Other nations' trade policies also play a major part. By subsidizing exports and providing more favorable terms of trade, they are able to sell their relatively much smaller agricultural surpluses at prices that undercut U. S. exports. Most nations that import farm products also have protectionist policies that cushion their producers and consumers from the impacts of fluctuations in world market prices. As a result, the United States, because of its relatively free trade practices and open agricultural markets, bears most of the burden of adjusting to changes in world trade.

In short, the internationalization of U. S. agriculture, while allowing crop farmers to utilize their resources more fully and to earn higher average incomes, exposes them to new and pervasive sources of instability. In the 1970s farm prices and incomes were more variable from year to year than in the previous two decades, reflecting in part the growing influence of international events and conditions. If the United States maintains relatively open agricultural markets, farmers will continue to face greater uncertainty because of the dependence of the U. S. crop economy on volatile export markets. Their incomes are already more variable than nonfarmers' (see Figure 1), and thus instability is likely to increase.

POLICY PERSPECTIVE

The federal government shares part of farmers' risk, through agricultural price support programs and crop insurance. These programs expose taxpayers to large outlays in years of market surplus when prices are low. In 1983, outlays for crop programs reached a record $13.1 billion. 1/ Over the next several years they are projected at $7 to $8 billion, substantially higher than the long-term historical average of $2 billion per year.

Present farm programs have evolved over a long period of time, and in recent years the level of risk assumed by the public sector has decreased, leaving crop farmers more dependent on markets. The programs have also tended to focus less on increasing prices and incomes and more on stabilizing prices. They have never directly focused on stabilizing incomes. Now that farmers have become more fully integrated into the domestic and international economies, commodity programs have less capacity to achieve any of these purposes.

The objectives of farm policy have not been explicitly defined by the Congress. In its legislation and in executive branch program administration, however, these sometimes conflicting purposes have been emphasized:

- To achieve a reasonable degree of stability in farm prices and incomes;

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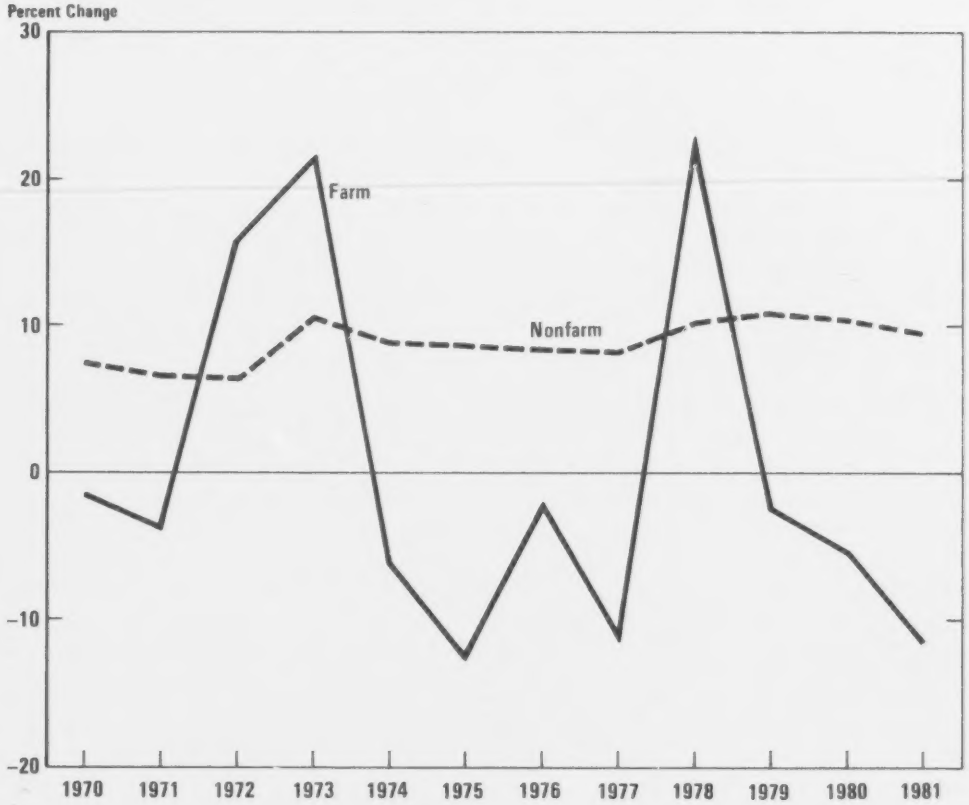
1. In fiscal year 1982, the wheat, feed grain, rice, and upland cotton programs accounted for $9 billion of the total $11.6 billion outlay for agricultural price support programs. For fiscal year 1983, crop program outlays are estimated at $13.1 billion, about two-thirds of the $21.3 billion outlay for all price support programs.

Figure 1.
Income per Capita for Farm Operator Families and for the Nonfarm Population, 1970-1981.
(Percent change from previous year)



SOURCE: U.S. Department of Agriculture, *Economic Indicators of the Farm Sector, 1981,* ECIFS 1-1 (August 1982).

NOTE: Farms are those with $40,000 or more of annual gross sales, which produce most of U.S. agricultural output. Income of farm operator families is from both farm and nonfarm sources. Income of nonfarm population is disposable personal income, based on the National Income Accounts.

- To provide a rate of return to farm assets comparable to returns on investment in other sectors;

- To provide an adequate and stable supply of food and fiber for U. S. consumers at reasonable prices;

- To improve the ability of U. S. agriculture to compete in international markets; and

- To keep the taxpayer costs of farm programs relatively low.

Implicit in these objectives is a public concern with how farmers adjust to risk and income instability. Economists believe that a reduction of risk and uncertainty can promote investment and the adoption of new technology, resulting in lower average costs and a higher level of output. Second, farm families can benefit from a reduction in year-to-year variability in farm income, and so also might rural communities and agriculture-related industries. A third consideration is that current farm programs expose taxpayers to large outlays.

A basic issue is whether any alternative approach to farm income stabilization can help farmers better manage risk and at less cost to taxpayers. Present commodity policies place farmers in a position of increased dependence on market forces, but also involve large expenditures.

FARM REVENUE INSURANCE: AN ALTERNATIVE

The purpose of this paper is to examine revenue insurance as a way of assisting crop farmers in adjusting to income instability. The option evaluated in this paper would aim to reduce the year-to-year variability in farmers' incomes about some average level, but not to increase the average level. It implicitly assumes that the average level of income over time will be sufficient to maintain resources in agriculture.

Chapter II discusses the major shortcomings of present policy and sets the stage for examining alternatives. Chapter III describes how a farm revenue insurance program might work, and its potential consequences and problems. The Appendix discusses forward pricing in futures markets, including commodity futures options.

CHAPTER II. HOW FARMERS MANAGE THEIR RISKS AT PRESENT

Before examining farm revenue insurance in the next chapter, this chapter discusses the ways in which crop farmers now manage their production, price, and income risks. Basically, they have three options: (1) they can bear risks directly; (2) they can transfer risks to others in the private sector through the insurance and futures markets; or (3) they can transfer risks to the public sector through commodity programs and federal crop insurance.

DECISIONMAKING UNDER RISK AND UNCERTAINTY

Unlike most businessmen, farmers must invest their capital with relatively little influence over the prices they receive for their products or the prices they pay for materials and services. The amount of risk a farmer perceives and is willing (or able) to accept is largely determined by his knowledge, temperament, spending plans, enterprise combination (an enterprise being the production of a specific crop or livestock product), and financial reserves. For these reasons, farmers differ considerably in how they perceive risk. Most appear to be risk-averse. A risk-averse farmer will value a risky alternative--that is, one with a large variance around its expected value--at less than that value. As a result, he will use fewer resources in agricultural activities than he would if the same expected returns were certain or if he were less risk-averse.

Most economists believe that measures to reduce uncertainty tend to free venture capital for the pursuit of new activities, leading to an increase in net investment and economic growth. As applied to farming, either through government programs or through private-sector arrangements, such measures tend to increase the level of investment and current input expenditure for any given level of average price and income expectations. 1/ They also encourage the adoption of new technology, resulting in lower average costs and a higher level of output.

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1. See Peter M. Emerson, Public Policy and the Changing Structure of American Agriculture (Congressional Budget Office, 1978), pp. 42-45.

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BEARING RISKS DIRECTLY

Farmers may bear income risks directly through such strategies as diversifying their enterprises and investing in land, buildings, and machinery that allow more flexibility. The possibility of diversification may be limited, however, if there are only a few enterprises available that offset one another in their returns; also, there may be a loss of economic efficiency from diversification. Alternatively, farmers may adjust to risks by operating with less borrowed capital or by increasing their financial reserves, but doing so reduces the opportunity to expand. Moreover, many farmers cannot draw upon accumulated wealth in periods of adversity, as their reserves are in the form of real estate and therefore not liquid.

Farm families have increasingly relied upon income from nonfarm employment to help them bear the risk of variable income from farming. Nonfarm income averaged about 55 percent of total farm income in 1975-1979. Some farm families draw most of their income from nonfarm sources (see Table 1). In fact, in 1981 families on farms with sales of less than $40,000 had negative incomes from farming. This group, representing about 72 percent of all farms, produces only about 12 percent of total farm output (as measured by cash receipts from farming) and accounts for more than 80 percent of total nonfarm income earned by farm families. On larger farms the picture is different: the 12 percent of all farms with gross sales of $100,000 and over, which produce about two-thirds of farm output, earn more than 80 percent of total family incomes from farming. They account for about 90 percent of the total net income from farming. An important middle group--the approximately 16 percent of farms with gross sales of $40,000 to $99,999, which produce about 20 percent of farm output--earned about a third of their family income from farming in 1981.

In sum, nonfarm employment is the main source of income for most of the nation's farm families, and not unimportant to the rest. It smooths out the year-to-year swings in farm income. Although farms with annual gross sales of $100,000 and over generate far larger incomes per family, these families experience greater year-to-year income variability than those who are more dependent upon nonfarm income.

TRANSFERRING RISKS TO OTHERS IN THE PRIVATE SECTOR

Farmers transfer price and income risks to others in the private sector, primarily through forward contracting in cash or futures markets. To some extent, financial institutions and insurance companies also bear some of the risks.

TABLE 1. FARM INCOME BY VALUE OF SALES CLASS, CALENDAR YEAR 1981

Annual Gross Sales (In dollars)	Number of Farms	Percent of All Farms	Percent of Total Cash Receipts from Farming	Net Farm Income per Farm (In dollars)		Average Income per Farm Family (In dollars)
500,000 and Over	25,000	1.0	30.4	518,635		
200,000 to 499,999	87,000	3.6	18.9	45,666	66,790 a/	80,562 b/
100,000 to 199,999	186,000	7.6	19.1	15,867		
40,000 to 99,999	396,000	16.3	19.0	3,813		12,356
20,000 to 39,999	278,000	11.4	6.1	-880		9,285
10,000 to 19,999	286,000	11.7	3.2	-1,022		12,999
5,000 to 9,999	335,000	13.8	1.9	-988		17,430
Less than 5,000	843,000	34.6	1.4	-1,142		21,137
Total or All-Farm Average	2,436,000	100.0	100.0	8,042		24,187

SOURCE: Congressional Budget Office from U. S. Department of Agriculture, Economic Indicators of the Farm Sector: Income and Balance Sheet Statistics, 1981, ECIFS 1-1 (August 1982).

a. Average net farm income per farm family of all farms with more than $100,000 in gross sales.

b. Average income per farm-operator family for all farms with more than $100,000 in gross sales.

Forward Contracting

Forward contracting permits a farmer to lock in a price for his crop before it is harvested. It is accomplished by a contract between the farmer and buyer, typically specifying quantity, quality, and delivery date. The contract may specify either a cash price or a "basis" price tied to the futures price but adjusted to the cash price at local markets. Forward pricing through delivery contracts reduces price risks, but subjects the farmer to the risk of not being able to make full delivery of the contract amount. For this reason, forward cash sales are usually for less than expected production.

Forward pricing is facilitated by well-developed futures markets for major agricultural commodities. These bring farmers and commodity users wanting to hedge against adverse price movements together with speculators wanting to gain from price movements. The Appendix describes the futures hedging transaction by which a farmer locks in a specific price. It also discusses options on agricultural commodity futures, which have recently been legalized. Commodity futures options may provide farmers with an additional tool for transferring risks to the private sector.

Farmers' use of futures markets to hedge price risks is not extensive. The major participants seem to be large commercial farmers with gross annual sales of $100,000 or more. Most others do not trade in futures because (1) they lack information, time, and expertise; (2) their crops are small relative to the size of futures contracts; (3) they face transaction costs, including uncertain margin calls; (4) futures contracts rule out the chance to gain from price increases; (5) government price support programs, which set minimum floor prices, offer a better opportunity for risk sharing; and (6) they distrust futures markets. 2/

Forward pricing in cash or futures markets can usually reduce price risks no more than one year ahead. In comparison, federal commodity programs reduce price risks for a longer period since farmers are generally assured that minimum prices for future crops will be no less than current levels of price support. Farmers making capital investments generally prefer the kind of long-term certainty provided by government programs.

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2. John W. Helmuth, Grain Pricing (Commodity Futures Trading Commission, September 1977).

Banking and Insurance

Financial institutions also share risks with farmers by providing credit for capital purchases and current operating expenses, and through emergency lending or refinancing. Indeed, in today's highly capitalized agriculture, the risk of inadequate incomes to repay loans is a major factor influencing farmers' production and expansion decisions, and lenders' willingness to extend credit. Increasingly, lenders are encouraging prospective borrowers to reduce income risks as a condition for credit extension.

To some extent, farmers transfer risks to insurance companies. By pooling risks among farmers and over regions, insurance permits farmers to protect themselves against production losses, although private insurance companies limit their coverage to insurable single perils--mainly hail and fire.

SHARING RISKS WITH THE FEDERAL GOVERNMENT

The federal government shares some of the risks in crop farming through two types of programs: (1) commodity programs to support and stabilize prices and incomes; and (2) crop insurance to reduce income variability from production losses. Commodity programs help to reduce market uncertainty while crop insurance helps to reduce production uncertainty.

Commodity Programs

Since the 1930s, farm legislation has pursued the objectives of increasing and stabilizing farm prices and incomes through a variety of programs, changing slowly over time to meet new conditions. The key elements of current policy are described below.

Non-Recourse Loans. The basic purpose of the loan program is to allow a farmer to defer marketing his crop when prices are low in expectation of higher prices in the future. When market prices are low, eligible farmers can put their crops in storage at their own expense and use them as collateral for nonrecourse loans from the Commodity Credit Corporation (CCC). The amount of loan per bushel is termed the "loan rate"; acceptance of the loan provides the farmer with immediate cash while he waits for prices to firm. If they do not, and the farmer elects not to repay his loan, the CCC agrees to accept the commodity as full satisfaction of the debt. In that case, however, the farmer would bear the cost of shipment to a location prescribed by the government. Alternatively,

a farmer may choose to repay the loan with interest on or before its maturity date (usually nine months) and take over the storage and marketing of the commodity himself. In this way farmers are guaranteed cash for their crops at a minimum price--the loan rate--without losing the opportunity to gain from future price increases. Loan rates are set below expected average market prices to keep U.S. farm products competitive in the world market and to minimize the loan rates' influence on production. Thus, nonrecourse loans provide a relatively low level of price support.

Farmer-owned Grain Reserve. Under this program a farmer contracts with the government to store grain for a three-year period. He may enter grain directly into the reserve, or transfer grain already in storage under a nonrecourse loan into the reserve. In either case, the farmer receives a loan equal to the reserve loan rate multiplied by the quantity entered into the reserve. To encourage reserve entry, farmers are reimbursed annually for the expenses they incur in storage, and interest on loans may be waived or adjusted. Financial penalties deter a farmer from repaying the loan before market prices reach a predetermined release price. Storage payments terminate when the market price reaches the trigger release price. At the trigger release price or above, farmers can repay their loans, plus unearned storage payments, and sell the grain.

Deficiency Payments. Producers of wheat, feed grains, rice, and upland cotton who comply with all program provisions are eligible for deficiency payments if the national average market price for a crop for a specified period falls below a target price. Target prices are set by the Secretary of Agriculture based, in part, on a cost-of-production formula, but minimum levels are set by the Agriculture and Food Act of 1981. The payment rate is the difference between the target price and the average market price, or between the target price and nonrecourse loan rate, whichever is smaller.

Acreage Controls. To reduce supplies and budget outlays, the Secretary has the authority to require farmers to reduce planted acreages in order to be eligible for these program benefits. In addition, farmers may be offered payments in cash or in kind to divert acreage from production. In 1983, producers of wheat, feed grains, upland cotton, and rice were offered both cash and in-kind payments for additional acreage diversion if they first reduced acreage as a condition for program benefits. Because payment-in-kind rates were so attractive--95 percent of normal production per acre for wheat and 80 percent for the other crops--farmers diverted a total of 77 million acres under these programs. This was roughly equivalent to a third of the acreage planted to those crops in 1982.

How Farmers Use Commodity Programs

Farmers may use nonrecourse loans and the farmer-owned grain reserve to transfer price risks to the public sector. For example, in 1982 an eligible corn farmer could receive a nonrecourse loan of $2.55 per bushel or choose to place corn in the reserve at a loan rate of $2.90 per bushel, and in addition receive an annual storage payment of 26.5 cents per bushel. These programs assured participating farmers that the prices they received would not fall below the loan rates; thus, the programs reduced downside price risks.

In addition, deficiency payments help support incomes when market prices fall below target prices; these payments transfer some of the income risks to the public sector. For example, in 1982 an eligible corn farmer received a deficiency payment of 15 cents per bushel, the difference between the target price of $2.70 per bushel and the nonrecourse loan rate. These income transfers, however, are generally small for most producers since they are distributed in proportion to the volume of production. In crop year 1981, about 6 percent of those (typically larger) producers participating in the wheat, feed grains, and upland cotton programs received about 57 percent of total deficiency payments under these programs--an average payment per individual of $10,824 as compared to $551 for all other smaller participants. 3/ On a per farm basis, the largest proportion of direct government payments goes to those farms with annual sales of farm products of $40,000 or more. In recent years this group (about 28 percent of all farms) has received roughly 70 percent of such payments. 4/

Changes in Commodity Programs

Current commodity programs are the product of a long-term transition in policy that began in the late 1950s and was embodied in the Food and Agriculture Act of 1965. The basic policy approach was to reduce price supports to world price levels or below and to make direct payments to farmers to encourage them to participate in voluntary supply control programs. The transition in commodity policy was evident in the 1965-1970 period, when average real (adjusted for inflation) price supports for wheat, corn, and upland cotton were nearly 50 percent below those of 1955. The

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3. Unpublished data from the United States Department of Agriculture.

4. U.S. Department of Agriculture, Economic Indicators of the Farm Sector: Income and Balance Sheet Statistics, 1981, ECIFS 1-1 (August 1982).

lowering of price supports (domestic prices) encouraged exports and permitted the eventual elimination of export subsidies. As shown in Table 2, income support payments from the mid-1960s to the early 1970s averaged about $2.1 billion annually and were an important part of crop farmers' incomes. At the same time, a significant proportion of acreage was being diverted to conservation uses--about 20 percent of total cropland.

During the 1970s, an explosion in agricultural exports reduced the importance of commodity programs to crop farmers' incomes. Real price supports continued to decline, and from crop years 1974 through 1980 income-support payments to crop farmers totaled $3.5 billion, mostly for the 1978 and 1979 crop programs, averaging only about 25 percent of earlier annual levels (see Table 2). 5/ Moreover, during 1974-1980 cropland diversion programs were implemented only in 1978 and 1979 (on a small scale). Federal price support outlays for crop programs averaged about $1.7 billion annually over fiscal years 1975-1981, about two-thirds what they had been in 1966-1970. 6/ This reduction in outlays was a manifestation of changes both in policy and in market demand.

Despite the changes in policy, taxpayers are still exposed to very large outlays when domestic crop supplies are excessive relative to government price support levels and export demand. This has been the case in recent years; crop price support outlays were nearly $9 billion in 1982 and $13.1 billion in 1983. The principal reasons for the contraction in export demand in the early 1980s were worldwide economic and financial problems, the appreciation of the dollar against other currencies, political tensions between the United States and the USSR, and high U. S. price support levels for grains. 7/

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5. These data exclude disaster payments. The payments were mainly deficiency payments, but the total includes some diversion payments for 1978 and 1979. Payment data are from the annual Report of Financial Conditions and Operations of the Commodity Credit Corporation, United States Department of Agriculture.

6. Price support outlays included mainly deficiency payments, disaster payments, and commodity loans. These outlays were only for wheat, feed grains, rice, and upland cotton. They averaged about two-thirds of total annual price support outlays for all commodities.

7. See Congressional Budget Office, Agricultural Export Markets and the Potential Effects of Export Subsidies (June 1983).

TABLE 2. NET PRICE SUPPORT OUTLAYS FOR WHEAT, FEED GRAINS, RICE, AND UPLAND COTTON PROGRAMS, BY FISCAL YEAR (In millions of dollars)

Year	Income Support Payments	Other a/	Total
Average 1966-1970	1,931	356	2,287
Average 1971-1974	2,278	-143 b/	2,135
1975	5	428	433
1976	2	357	359
1977	129	2,683	2,812
1978	1,741	1,580	3,321
1979	1,560	87	1,647
1980	136	2,017	2,153
1981	--	1,370	1,370
1982	--	8,989	8,989
1983	3,791	9,309	13,100

SOURCE: Congressional Budget Office from U. S. Department of Agriculture data.

a. Mainly commodity loans.

b. Minus denotes net receipts.

Commodity Policy and the Sharing of Farming Risks

Because the transition in commodity policy has reflected the view that farmers should depend on markets for adequate prices and incomes--a view

that was accommodated by an expansion in export demand--farm programs today are less supportive of prices and incomes than in the past. This is so for several reasons. First, the extent to which these voluntary programs can in themselves measurably increase prices and incomes is determined in part by the number of farmers who participate. A farmer decides whether to participate in commodity programs according to his expectations of relative economic outcomes. If no acreage reductions are required as a condition of eligibility, there are no real costs in participating. On the other hand, if acreage adjustments are required then he must assess the costs of idling acreage in exchange for the program benefits. Normally, many farmers decide against participating, presumably with the expectation of receiving adequate prices and earning satisfactory incomes without it. As a result, in periods of surplus crops, commodity programs typically do not induce enough farmers to remove sufficient acreage to reduce production and increase prices significantly, but can result in large outlays to finance participating farmers' inventories.

Second, with respect to income levels, the effect of farm programs on income levels is uncertain. Unless acreage diversion raises farm prices enough to offset reduced output, it will not lead to higher incomes (excluding government payments).

Third, apart from the recent changes in farm policy, the power of commodity programs to increase prices and incomes has decreased because farmers' economic fortunes are now strongly influenced by changes in the domestic and international economies--largely beyond the influence of farm programs.

In sum, changes in policy and the growing dependence upon international markets lead to two important conclusions about commodity programs: (1) they are less able than formerly to increase the level of farm prices and incomes; and (2) they have limited capacity to moderate fluctuations in incomes caused by international events and conditions. Recent events demonstrate that marginal adjustments under current programs can do little to protect farmers against the effects of unanticipated changes in export demand resulting from good crops abroad, poor economic conditions worldwide, a strong U. S. dollar, and other nations' policies. Furthermore, it is clear that increases in U. S. prices act to discourage foreign consumption of U. S. crops and to encourage foreign production. To the extent that commodity programs raise farm prices, they can work to the disadvantage of U. S. farmers and taxpayers.

Today's commodity programs, in comparison to those of the 1950-1972 period, represent a reduction in the sharing of farming risks by the public sector. There is general agreement that farm prices and incomes are less

variable than would be the case if there were no commodity programs. There is, however, a growing realization that commodity policy that focuses on price stabilization can be a costly and ineffective way to reduce income instability stemming from global weather and economic, trade, and foreign policies.

Crop Insurance

Federal crop insurance, which has been in existence in some form since the late 1930s, helps farmers to reduce income instability from production losses. The program provides all-risk insurance that covers unavoidable physical losses from adverse weather conditions, insects, plant diseases, and other causes. The federal government provides this insurance because private insurance companies cannot cope with the large variability in annual losses.

Federal crop insurance guarantees a farmer a specific amount of production; if he harvests less than the guaranteed amount as a result of insurable causes, he is paid for the shortage at one of three preselected price options per commodity unit. A farmer may also choose one of three levels of yield coverage--50, 65, or 75 percent. Premiums vary directly with the level of yield guaranteed and the price selection, and risks are determined on the basis of yield data for individual farms, counties, or areas within counties. Starting with the 1981 crops, premiums were subsidized by 30 percent on coverage up to 65 percent of average production. Operating and administrative expenses continue to be fully subsidized.

The Federal Crop Insurance Act of 1980, which authorized the premium subsidies, aims to expand federal crop insurance to make it the primary form of federal production protection. In crop year 1981, the expanded program insured nearly three-fourths more acreage than in 1980, or about 13 percent of the U. S. total. In crop year 1982 about 15 percent of U. S. cropland was insured. The Federal Crop Insurance Corporation (FCIC) intends eventually to assure that all farmers producing the major crops can purchase crop insurance. It also intends to make increasing use of private insurance companies and agents in selling the insurance.

Federal outlays for crop insurance include: (1) administrative and operating expenses, (2) indemnities in excess of premium income; and (3) premium subsidies. Outlays averaged about $26 million yearly in fiscal years 1977-1981. With the expansion of the program, outlays have risen and are estimated at $308 million in fiscal year 1983.

Farmers have not yet participated extensively in federal crop insurance. There appear to be two basic reasons for this. First, other federal disaster programs furnish a disincentive to participation in federal crop insurance. For example, disaster payments were made to producers of wheat, feed grains, rice, and upland cotton for the 1974 through 1981 crops, and to upland cotton producers in 1982. These payments, which amounted to free insurance, averaged nearly $500 million per year over the period. Emergency disaster loans, at highly subsidized interest rates, were also available to many farmers. Now, however, disaster payments have generally been terminated and interest rates for disaster loans have been increased. 8/

Second, a farmer's decision to buy crop insurance depends both on his attitude toward risks and his view of yield variability. A farmer who assigns a very low probability to yields below 75 percent of normal is unlikely to participate. For this reason, some farmers are unlikely ever to purchase federal crop insurance.

Nevertheless, federal crop insurance can be an effective option for managing production risks. And premium subsidies are an incentive for some farmers to buy insurance who would not otherwise do so. Where one would expect long-run insurance benefits (indemnities) to be roughly equal to insurance costs (premiums), premium subsidies reduce a farmer's insurance costs and thus increase his long-term net benefits. Moreover, crop insurance in one year of bad weather can pay indemnities great enough to offset many years of premiums.

POLICY IMPLICATIONS

A case can be made that the nation still has an interest in policies that help farmers manage their risks. Indeed, federal policy has long acknowledged this viewpoint even as changes in commodity programs reduced the level of risk assumed by the public sector and increased farmers' dependence on markets. While such a policy transition was appropriate in itself, the result is a set of commodity programs that are costly to taxpayers and often not used by farmers, and that are not very effective in reducing income instability arising from unanticipated changes in the demand for U. S. farm products overseas. It is from this viewpoint that alternative public policies for stabilizing incomes need to be examined. The next chapter looks at one such alternative--farm revenue insurance.

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8. The Agriculture and Food Act of 1981 gives the Secretary of Agriculture the authority to make disaster payments under certain circumstances, but they are no longer mandatory.

CHAPTER III. FARM REVENUE INSURANCE AS A NEW APPROACH TO RISK MANAGEMENT

The basic objective of insurance is to share the risk of loss among a large number of similarly exposed indivduals. Even though each individual's exposure to misfortune may be quite unpredictable, the risk for the group as a whole can be estimated with a fair degree of accuracy. Because the risk is pooled, an individual can obtain protection at a relatively small cost. In addition to distributing the burden of loss over individuals, insurance distributes losses over time through the accumulation of reserves.

FARM REVENUE INSURANCE 1/

A farm revenue insurance program would seek to protect crop farmers against the risk of highly variable incomes. It would do so by guaranteeing a farmer that annual revenue per acre for specific crops would be no less than some proportion of average or expected revenues. Revenues, or gross income, would be insured rather than net income. (Insuring net incomes would require taking account of differences in production costs among farmers, as well as covering input price risks.) Farmers would have an incentive to reduce average per unit costs, however, in order to increase the net income associated with any level of insured revenues.

The current federal crop insurance program is a limited form of revenue insurance--it insures against low revenues resulting from produc-

1. It is important to understand that the policy objective of farm revenue insurance is to reduce the year-to-year variability in crop farmers' incomes. Implicit in this objective is the expectation that average incomes over time, although highly variable, will generate adequate returns to resources in agriculture. Farm revenue insurance as outlined in this chapter is considered as either a replacement for current price support programs or a complement to current programs redirected to a price stabilization objective. If the policy objective is to increase the average level of income over time, then farm revenue insurance is not an appropriate policy tool--it is designed to reduce the variability about a mean level of revenues, not to increase the mean.

tion losses. 2/ Revenue insurance would extend this to cover low revenues resulting from price changes.

The farm revenue insurance program outlined below has two important limitations:

- o It would serve to stabilize incomes, but not to raise their general level.
- o It would not provide a high enough level of protection to make farming virtually risk-free. It would only protect against revenue shortfalls beyond a normal range of variation.

A Prototype of a Farm Revenue Insurance Program

Revenue insurance in a simple form as an extension of crop insurance could work as follows. A corn farmer might insure 75 percent of average revenues per acre on the basis of recent experience--the insured level being below the normal range of variation. With historical revenues averaging, say, $270 per acre and a corn crop of 100 acres, the insured level of revenues would be $20,250 (75 percent of $27,000). If revenue from the corn crop was less than $20,250, the farmer would receive an indemnity equal to the difference. It would be difficult to determine actual revenues for every insured farmer because prices received vary widely among farmers due to differences in pricing and marketing strategies. Instead, revenues would be estimated for each farmer from average state or local prices, and from actual farm yields.

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2. For example, suppose that a farmer has 100 acres of corn with average yields of 100 bushels per acre. At maximum federal crop insurance coverage, he can insure 75 percent of his average production, or 7,500 bushels. To value the physical coverage, he selects a price of $2.70 per bushel (there is a choice of three prices, and premiums increase with prices). If production is below 7,500 bushels, the farmer will receive an indemnity equal to the difference between actual output and 7,500 bushels valued at $2.70 per bushel. If production is only 5,000 bushels, the indemnity will be $6,750 (2,500 bushels x $2.70 per bushel). In the event of a total crop failure, the indemnity will be $20,250 (7,500 bushels x $2.70 per bushel). In the latter case, the indemnity will represent his total revenue. In the former case, total revenue includes the indemnity plus sales receipts from 5,000 bushels.

If an isolated natural hazard such as hail reduced a farmer's corn crop, his revenue insurance would work in a way similar to federal crop insurance. With a total crop failure the indemnity would be $20,250. If the farmer's yield was only 60 percent of average, making his estimated revenue approximately 60 percent of average, or $16,200 (100 acres x $270 x .60), he would receive an indemnity of $4,050 ($20,250 less $16,200) to bring his estimated revenue up to the insured level. Indemnities in both these examples are triggered by production losses from isolated causes.

But widespread production losses--resulting from drought, for example--would probably act to increase average prices because of the negative correlation between yields and prices. 3/ Increased prices would offset to some extent reduced production and obviate the need for indemnities. For example, in the case where yields fall to 60 percent of the historical average, average prices might rise to levels 45 to 50 percent higher than in the past. This would result in revenues greater than the insured level, despite the loss in production. In such a case there would be no indemnity. Unlike crop insurance, which would pay indemnities in the event of widespread production losses, revenue insurance would consider the effects of prices on estimated revenues.

On the other hand, revenue insurance might pay indemnities if yields were higher, causing market prices to fall. This would most likely happen in a year following a one- or two-year period of large crops. In such a year, continued above-average yields could cause prices to fall far enough so that average revenues per acre would be less than the insured level.

Moreover, a revenue insurance program would take into account the influence of demand on prices. Farmers would be protected against export contractions that caused prices and revenues to fall. By the same token, they would not be indemnified if a surge in exports raised prices enough to bring revenues above their insured levels.

In summary, the revenue insurance option described above would guarantee a farmer that revenues per crop would not fall below a minimum level regardless of whether production or prices were the cause of revenue shortfalls. In exchange for this guarantee, the farmer would pay an annual premium. Under an ideal insurance scheme, his long-run premiums would approximate his indemnity payments so that his average annual revenue

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3. State data tend to support this conclusion. Statistical analyses of 1972-1980 state average yield and price data indicate that yields and prices were negatively correlated in most of the major corn, soybean, wheat, and cotton states.

(considering premiums and indemnities) would be the same as in the absence of insurance. But the insurance would reduce year-to-year variability in revenues, increasing them through indemnities in poor years and reducing them through premium payments in all other years.

POTENTIAL CONSEQUENCES OF FARM REVENUE INSURANCE

How would revenue insurance affect farm prices, incomes, crop inventories, resource allocation, and federal outlays? The following section attempts a rough assessment of the potential consequences of the program by (1) comparing it with current policy, assuming that revenue insurance replaces current programs; and (2) examining revenue insurance as a complement to current programs that focus on price stabilization.

Farm Revenue Insurance as a Replacement for Current Policy

Revenue insurance might have a number of advantages over current programs. First, the government would not directly influence prices, production, and the allocation of supplies by subsidizing farmers' inventories as it now does under commodity programs. Second, crop farmers' revenues would be less variable from year to year. And third, total federal costs might be lower with revenue insurance than under the current set of commodity programs. On the other hand, in stabilizing incomes rather than prices and supplies, farm revenue insurance would allow greater swings in farm product prices (and therefore in prices paid by consumers) than current programs. A government-held grain reserve could help to prevent sharp price increases and commodity shortages.

Prices. Crop prices would probably be more variable from year to year and within each year without the price stabilization features of current commodity programs. Prices might be expected to fall more in surplus periods without the price floors set by nonrecourse loans and reserve loans. Grain prices would tend to increase more in tight supply periods if there were no reserves to dampen price increases. Consumers might feel the impact of greater price instability and more uneven market supplies, depending on the level of stocks carried by farmers and those firms involved in grain processing, manufacturing, and exporting. Farmers most likely would carry smaller inventories without the current financial incentives that make it less costly to hold stocks. Furthermore, in the absence of nonrecourse loans and the reserve, the government would not have to carry stocks because it would no longer be the buyer of last resort. If farmers and the government held smaller stocks, then processing, manufacturing, and exporting firms would have to consider whether to increase their usual inventories to assure stable supplies.

Under revenue insurance the federal government would be less a source of uncertainty and instability, since it would not influence markets as it does under current programs. Nevertheless, as suggested above, public policy would have to address price instability in some manner. One means of reducing price instability and protecting consumers against shortages would be to establish a reserve, perhaps owned by the government or held by farmers under government control.

Although crop prices would tend to be more variable under revenue insurance, the average level might not change substantially. Many analysts believe that the long-term average level of market prices has not been much increased by price support programs--a view supported in part by experience in the 1970s. But if revenue insurance raised output by reducing farmers' risk more than current programs do, average prices might tend to be somewhat lower. For at least two reasons, however, it seems unlikely that the level of aggregate output would be significantly greater with revenue insurance. Commercial crop farmers are already highly specialized and capitalized; they would not be likely to increase their output unless they perceived that farm revenue insurance would further reduce their risks as compared to current programs. Even if they did, participation would have to be high to affect aggregate output.

Incomes. Crop farmers' revenues, or gross incomes, would be less variable from year to year because revenue insurance would smooth out the sharp swings. Average revenue levels, as compared to those under current programs, would be influenced by prices, production, and revenue insurance premiums. If revenue insurance induced more production and lower prices, then average revenues would tend to be smaller. This would happen because the quantity demanded would increase less, in relative terms, than prices would decline. In addition, the insurance premiums paid by farmers would reduce net revenues. Therefore, as compared to current policies, crop farmers might experience slightly lower but more stable revenues under farm revenue insurance--although it is conceivable that reduced uncertainty might contribute to improved productivity and thus increase net incomes.

Federal Outlays. Federal outlays for revenue insurance would be dependent upon: (1) specific insurance provisions; (2) the level of insurance coverage; (3) subsidy levels; and (4) farmer participation. Because of these factors, it is difficult to compare the costs of revenue insurance with the costs of continuing current programs. Under the broad conditions outlined in the next section--accepting the present average level of nominal income, insuring for only below-normal revenue shortfalls, and assuming effective program management--it is likely that revenue insurance would cost less than the projected costs ($7-$8 billion) of continuing current programs.

This tentative conclusion is based upon several considerations. First, under current programs, 30 to 40 percent of price support outlays are for price stabilization activities--nonrecourse loans, the farmer-owned grain reserve, and related expenditures. Farm revenue insurance would not require these outlays, although there might be some costs for a reserve to protect consumers. Second, the administrative and operating expenses of a farm revenue insurance program probably would be no more than those incurred for current price support and crop insurance programs. Third, some portion of the program costs could be passed to farmers through insurance premiums. Of course, the level of premium subsidy would be the subject of debate, just as are the levels of price and income support under current programs.

Other Effects. If revenue insurance reduced farmers' income variability, this would probably improve their access to capital. Agricultural lenders are increasingly concerned about farmers' ability to meet debt obligations from cash incomes. Farmers, particularly those who have limited access to capital because they are relatively small or are new entrants, could use revenue insurance as a means to assure the capacity to meet debt obligations. Most likely, lenders would view revenue insurance as reducing farmers' risk and improving their creditworthiness.

Farm Revenue Insurance as a Complement to Price Stabilization Policies

The replacement of current programs with farm revenue insurance would be a dramatic policy change. As an alternative, revenue insurance could be used to complement price support programs that have the principle objective of price stabilization. As compared to current policy, the major features of a price stabilization approach would be: (1) a much wider price range; (2) flexible loan rates to assure the competitiveness of U.S. products in international markets; (3) smaller government-owned and farmer-owned reserve stocks; (4) less frequent acreage reduction programs; and (5) much smaller income transfers through deficiency payments. In other words, price supports would be maintained but the government would allow a much greater variation in prices before it intervened to protect relatively low price floors and high price ceilings. Since the emphasis would be on stabilizing prices, as opposed to increasing average prices, taxpayer costs would be less than under current policy.

Farm revenue insurance would protect farmers against income variability. If used as a complement to price stabilization policies rather than a replacement of them, it might have two advantages. First, prices would be less unstable. This would benefit consumers. Second, in conjunction with it, supply management via acreage reduction could be used to raise short-term

incomes. A disadvantage of using revenue insurance in this manner is that existing programs would still have the potential for high taxpayer costs if they were used to increase, rather than stabilize, farm incomes.

PRACTICAL CHALLENGES TO FARM REVENUE INSURANCE

A workable farm revenue insurance program would have to be carefully designed to meet certain practical problems.

Insurance Problems. From an insurance perspective, perhaps the main challenge to revenue insurance is the difficulty of measuring revenue risks and predicting the probability of future losses. Establishing insurance premiums that reflect individual farm risks is necessary to minimize adverse selection. If, for example, premiums represented average risk levels, then high-risk farmers would be encouraged to participate and low-risk farmers would not. The program would be collecting premiums for average risks and paying out indemnities on high risks. This would be costly.

Production risks, which are half of the revenue equation, can be predicted with reasonable accuracy on the basis of existing farm or county yield data. Price risks are another matter, however. Using yield data, one can estimate average revenue per acre and year-to-year variability from state price data. But because of the number of variables affecting prices, not the least of which is government policy, such revenue data may generate inaccurate predictions about the probability of losses. To address this problem, revenue data based on recent history would have to be examined carefully in the initial stages of implementation. As individual farm observations accumulated over time, this problem would be lessened.

A critical insurance problem lies in the fact that the incidence of price risks is not independently distributed among farmers. In other words, prices received by one farmer are typically closely aligned with prices received by others: a decline in corn prices because of an unanticipated drop in exports is felt by all farmers selling corn. Such a decline could make all insured farmers eligible for indemnity payments. Since the objective of farm revenue insurance is to provide protection against such declines, the cyclical pattern in agriculture could mean that in some years the program would pay out to a great majority of insured farmers and in others to very few. This could lead to variable participation from year to year, since in years when the market outlook was negative farmers would have greater incentive to participate than in years when the outlook was positive. In order for the program to work, farmers would have to participate on a multiyear rather than a year-to-year basis. They could be encouraged to do so through incentives such as premium discounts for multiyear contracts.

There are also "moral hazards" stemming from the behavior of the insured. Under certain conditions a farmer might be able to reduce his yields in order to profit from the indemnity. For example, if wet weather delayed corn planting past the optimum date, a farmer might plant the crop anyway but not fertilize it. The yield would be low, but he could claim the indemnity because of poor weather. This hazard could be minimized by basing expected revenues on average individual farm yields so as to penalize those who deliberately lowered their yields by reducing the level of insurance protection they would receive in future years. From the farmer's perspective, on the other hand, government actions could influence the expected returns to insurance. For example, if farmers believed that the government would build a reserve, thereby increasing prices, participation in revenue insurance would be less attractive.

Farmer Participation. To make revenue insurance viable, a relatively large number of farmers would have to participate. This would require that farmers understand the advantages of the program and that they be able to pay the premiums.

Farmers' perceptions of the necessity for revenue insurance would depend on their attitude toward risk, the alternatives available to them (such as forward pricing), and the economic characteristics of their businesses (extent of diversification, financial reserves, etc.). In general, those farmers who are most vulnerable to farm income variability would be most likely to want revenue insurance. These would include farmers dependent on the income from farming (such dependency increases with farm size); farmers with substantial debt-to-asset ratios; and new entrants. Clearly, not all farmers would have the desire to buy insurance; but not all would have to participate in order to have an acceptable pooling of risk.

Second, farmers would have to be able to pay the insurance premiums. This means that premiums should be as low as possible relative to the level of protection, and that long-term expected benefits should be attractive relative to costs. Premiums that reflect the full cost of providing farm revenue insurance would probably discourage many farmers from participating. Indeed, it seems likely, as evidenced by the subsidization of federal crop insurance, that premium subsidies would be necessary to encourage sufficient participation in revenue insurance. Such premium subsidies can be defended on the ground that society would benefit by sharing farming risks. An argument against them is that if the subsidies became substantial the program would reward inefficiency and become an income transfer program rather than insurance against income fluctuations.

CONCLUSION

This examination does not lead to a definite conclusion about the feasibility of farm revenue insurance as a replacement for, or a complement to, current programs. It has focused on only one type of insurance program, but its inferences are probably applicable to other insurance schemes.

A workable revenue insurance program would have to deal adequately with standard insurance problems such as (1) the measurement of risks and prediction of losses; (2) adverse selection; (3) moral hazards; and (4) farmer participation. If it met these problems, revenue insurance could be an effective policy for reducing the risk and income instability in crop farming.

If revenue insurance was used as a replacement for current commodity stabilization programs, crop prices would probably be less stable than at present. The instability could be handled by establishing reserves, with less government intervention than under current programs.

Revenue insurance would probably accomplish its purpose of protecting crop farmers against fluctuating incomes at less cost to taxpayers than current stabilization programs. Revenue insurance could not be expected to raise the average level of farm income over time. This means that it would work best in a scenario where export markets grew at a rate sufficient to utilize U. S. production capacity. In the long term, average incomes would generate adequate returns to resources, but from year to year they would be highly variable. Revenue insurance would help to reduce income instability by dampening sharp declines in revenues. In a long-term scenario of sluggish export growth, excess production capacity, and low but stable prices and incomes, revenue insurance would be less effective.

This examination suggests that revenue insurance has sufficient merit as a policy alternative to warrant further study. The Congress could undertake two initiatives. First, it could authorize additional studies of revenue insurance, including program design and implementation. Second, it could authorize a pilot revenue insurance program in selected areas to see how it would work in practice. A recent task force on farm income protection insurance recommended a three-year pilot program for that purpose, limited to a single commodity. 4/

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4. U. S. Department of Agriculture, Farm Income Protection Insurance, A Report to the United States Congress (June 1983). This report looked at several approaches to insuring incomes.

APPENDIX

APPENDIX. FORWARD CONTRACTING

This appendix briefly describes how farmers use futures markets to lock in prices for their crops. It also examines commodity futures options.

FUTURES MARKETS

Futures markets offer the farmer an opportunity to sell his crop in advance at a price that is reasonably certain. In the basic hedging transaction, a farmer acts to lock in a specific price for part of his crop in advance of harvest. For example, a corn farmer in July decides that a local price of $2.55 per bushel would guarantee a good profit on a portion of his crop. To lock in this price he sells a December futures contract at the current July price of $3.08 at Chicago. In doing so he commits himself to deliver corn at the contract price at the end of the contract month.

By early December, when the farmer actually sells his corn to a local elevator, the cash price has dropped by $0.35 (from $2.55 to $2.20 per bushel). The farmer liquidates his futures position by buying back the contract at $2.73 per bushel, earning $0.35 per bushel--the difference between the $3.08 per bushel at which he had contracted to sell the corn and the $2.73 per bushel it cost to buy the contract back. As a result of these transactions, the farmer earns a net effective price of $2.55 per bushel ($2.20 cash price plus $0.35 on futures). In this simple example, the farmer achieves his price objective of $2.55 per bushel, since his gain in the futures market offsets the decline in cash prices between July and December. However, he is still exposed to what is called "basis risk"--the risk that local cash prices and futures prices will not track together for a time.

In a hedging transaction, a farmer is also exposed to margin calls--the need for additional cash to cover the futures transaction if futures prices move against him. In the above example, the farmer would be required to put up cash equal to perhaps 5 percent of the value of the contract. If the price of the December contract increased from $3.08 per bushel, then the farmer would have to put up more cash to maintain his margin. He would then be exposed to the risk of establishing a larger futures position than needed. In this case, he becomes a speculator in the excess contract and is at serious risk.

COMMODITY FUTURES OPTIONS

In 1982, the Congress passed legislation lifting the statutory prohibition on agricultural commodity options trading. 1/ This legislation leaves it to the discretion of the Commodity Futures Trading Commission whether to proceed with pilot projects for agricultural commodity futures options. If functional commodity options markets eventually develop, crop farmers and other businessmen will have access to another risk-management tool.

Commodity futures options would allow a farmer to trade put or call options on futures contracts. The buyer of a put option has the right--not an obligation--to sell a futures contract for a specific month at a fixed price (the strike price) on or before a given date. The price of the option, called the premium, is fixed and therefore the buyer's liability is limited to the premium. If the sale of the underlying commodity futures contract at the option's strike price turns out to be unprofitable, the option is abandoned.

The most likely way a corn farmer would use commodity futures options to reduce price risk is by purchasing a put option on a futures contract. This transaction would give the farmer the right to sell and deliver, at some time in the future, a specific quantity of corn at a fixed price. The fixed futures price, net of delivery costs, would translate into an effective cash price. If the cash price declined to less than the futures contract price (less delivery costs), the farmer could exercise the right to sell and deliver under the terms of the futures contract. Or, since the premium for the put option would likely increase as cash prices declined, the farmer could sell the option; the profit on this transaction plus the cash price would increase his effective price. For either choice--dependent upon net returns and the practicality of physical delivery under the futures contract--the farmer would be assured a minimum price. On the other hand, if the cash price rose above the futures contract price, the farmer would not exercise the option and it would expire. In that case, for the cost of the option premium, he would have assured himself a minimum price but kept the opportunity to gain from increases in cash prices.

The distinction between this and hedging via a futures contract is important. The commodity futures option transaction limits the farmer's downside price risk by fixing a minimum price for his corn; but it does not preclude him from profiting in the event of price increases in the cash market. In contrast, hedging via a futures contract results in the gain (loss)

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1. The Commodity Futures Trading Commission reauthorization legislation.

in the futures market being roughly offset by the loss (gain) in the cash market. Through the options transaction, the farmer captures all the increase in the cash price, net of the option premium.

In addition to their use as price insurance, commodity futures options can also be used as insurance against uncertain output. For example, if a farmer forward contracts all of his expected crop, he is exposed to the risk of a production shortfall that would prevent full delivery. By purchasing a call option for some portion of the expected crop, the farmer can be assured of having an adequate supply to meet his delivery contract. In the event of a short crop, he can exercise the option to purchase and receive delivery under the futures contract.

In brief, commodity futures options will offer farmers an additional way to reduce price and income risks by transferring the risks to others. As compared to futures contracts, options may have some advantages. First, a purchased option may be used to assure a minimum price for an anticipated sale of a commodity in the future (price insurance) or to protect the value of an uncertain future level of commodity production at a known cost. The maximum loss on an option transaction is the premium. Second, purchased options involve no margin calls; the option premium is paid when the option is purchased and no other payments need be made during the life of the option. In contrast, futures positions may generate margin calls that could cause liquidity problems for hedgers.

FORWARD CONTRACTING AND PUBLIC POLICY

Commodity futures options, if markets develop sufficiently, will expand the forward contracting alternatives available to crop farmers. If this led farmers to make greater use of forward contracting in cash or futures markets, it might diminish the importance of federal commodity programs. That is, if farmers became more inclined to transfer risks to others in the private sector, they would have less need for commodity programs.

The alternatives are not mutually exclusive, however. Forward pricing serves to reduce price risks no more than one year ahead. In contrast, commodity programs reduce price risks for a longer period by generally assuring farmers that nominal minimum prices for future crops will be no less than current loan rates. In short, forward contracting permits a farmer to reduce price risks within a crop year while commodity programs act to reduce longer-term risks. Since farmers make investment decisions on the basis of long-term price and income expectations, they are interested in

reducing risks over more than a one-year period. This means that existing forward contracting toois, including potentially useful commodity future options, are not complete substitutes for commodity programs. 2/

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2. It has been suggested that the federal government could make commodity options a more viable tool for crop farmers by writing longer-term put options. Such a policy would help to reduce longer-term price and income risks. See Bruce Gardner, The Governing of Agriculture (The Regents Press of Kansas, 1981), pp. 108-12.